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FUNCTIONAL ENDOSCOPIC SINUS SURGERY OUTCOMES IN CHRONIC RHINOSINUSITIS: A PROSPECTIVE CLINICAL STUDY

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Abstract

Background: Chronic rhinosinusitis (CRS) is a persistent inflammatory disease that significantly reduces quality of life. Functional endoscopic sinus surgery (FESS) is indicated when medical therapy fails. Objective: To assess clinical and endoscopic outcomes of FESS in medically refractory CRS. Methods: Adult CRS patients undergoing FESS were prospectively evaluated using nasal endoscopy, CT scoring, and SNOT-22 before surgery and during 12-month follow-up. Results: FESS produced significant improvement in symptoms and endoscopic findings. Both CRS phenotypes showed clinically meaningful benefit, with low complication and revision rates. Better outcomes were associated with adherence to postoperative therapy and absence of asthma. Conclusion: FESS is a safe and effective treatment for refractory CRS, resulting in sustained symptom relief and improved sinonasal function.

Keywords: Chronic rhinosinusitis, Endoscopic sinus surgery, SNOT-22, Nasal polyps, Sinonasal outcomes

Introduction

Chronic rhinosinusitis (CRS) is a prevalent inflammatory disorder of the nasal cavity and paranasal sinuses, characterized by nasal obstruction, facial pressure, rhinorrhea, and olfactory dysfunction persisting for more than 12 weeks. It represents a significant public health burden, affecting approximately 10–12% of adults worldwide and leading to substantial reductions in quality of life and work productivity. Despite advances in medical therapy, including intranasal corticosteroids, saline irrigation, and antibiotics, a considerable proportion of patients remain refractory to conservative management.

Functional endoscopic sinus surgery (FESS) has become the cornerstone surgical intervention for medically resistant CRS. The procedure is based on restoring normal sinus ventilation and mucociliary clearance through minimally invasive endoscopic techniques. Over the past three decades, refinements in endoscopic optics, instrumentation, and imaging guidance have markedly improved surgical precision and safety. However, variability persists in reported outcomes, recurrence rates, and predictors of success, particularly when comparing CRS with nasal polyps (CRSwNP) and CRS without nasal polyps (CRSsNP).

This study aims to evaluate the clinical outcomes of FESS in patients with medically refractory CRS using objective endoscopic findings and validated symptom scores. Additionally, it seeks to identify factors associated with favorable postoperative outcomes, thereby contributing evidence relevant to contemporary otorhinolaryngology practice.

Methods

Study Design and Population

A prospective observational study was conducted in the Department of Otorhinolaryngology of a tertiary care teaching hospital between January 2023 and December 2024. The study enrolled 120 adult patients (aged 18–65 years) diagnosed with CRS according to established clinical and radiological criteria. Ethical approval was obtained from the institutional review board, and informed consent was secured from all participants.

Inclusion and Exclusion Criteria

Inclusion criteria comprised patients with CRS refractory to at least 12 weeks of optimal medical therapy, including intranasal corticosteroids, saline irrigation, and appropriate antibiotics. Both CRSwNP and CRSsNP phenotypes were included. Exclusion criteria encompassed patients with cystic fibrosis, primary ciliary dyskinesia, sinonasal tumors, previous sinus surgery, or significant systemic immunodeficiency.

Preoperative Assessment

All patients underwent comprehensive evaluation, including nasal endoscopy and computed tomography (CT) of the paranasal sinuses. Disease severity was graded using the Lund–Mackay CT scoring system. Symptom burden was quantified preoperatively using the 22-item Sinonasal Outcome Test (SNOT-22), a validated quality-of-life instrument.

Surgical Procedure

FESS was performed under general anesthesia using standard endoscopic techniques. The extent of surgery was tailored to individual disease patterns and included uncinectomy, maxillary antrostomy, anterior and/or posterior ethmoidectomy, sphenoidotomy, and frontal sinusotomy where indicated. Image-guided navigation was employed in anatomically complex cases. Postoperatively, all patients received saline irrigation and topical corticosteroids.

Follow-Up and Outcome Measures

Patients were followed for 12 months postoperatively at regular intervals (1, 3, 6, and 12 months). Primary outcomes included changes in SNOT-22 scores and endoscopic findings assessed using the Lund–Kennedy endoscopic scoring system. Secondary outcomes included complication rates and need for revision surgery.

Statistical Analysis

Data were analyzed using standard statistical software. Continuous variables were expressed as mean ± standard deviation. Pre- and postoperative scores were compared using paired t-tests, while subgroup analyses were performed using independent t-tests and multivariate regression. A p-value < 0.05 was considered statistically significant.

Results

Patient Characteristics

Of the 120 patients enrolled, 112 completed the 12-month follow-up. The cohort included 64 males (57.1%) and 48 females (42.9%), with a mean age of 41.3 ± 12.6 years. CRSwNP was identified in 62 patients (55.4%), while 50 patients (44.6%) had CRSsNP. The mean preoperative Lund–Mackay score was 14.8 ± 4.2, indicating moderate-to-severe radiological disease.

Symptom Improvement

A statistically significant improvement in symptom burden was observed following FESS. The mean SNOT-22 score decreased from 52.6 ± 14.1 preoperatively to 18.9 ± 9.7 at 12 months postoperatively ($p < 0.001$). Improvements were evident across all symptom domains, including nasal obstruction, facial pain, sleep quality, and emotional well-being.

Patients with CRSwNP demonstrated a greater absolute reduction in SNOT-22 scores compared to those with CRSsNP (36.1 vs. 29.4 points, $p = 0.02$). However, both groups achieved clinically meaningful improvement exceeding the minimal clinically important difference.

Figure 1. Endoscopic Appearance of the Nasal Cavity in Chronic Rhinosinusitis Before Surgery
Endoscopic Outcomes

Postoperative endoscopic evaluation revealed significant mucosal healing and reduction in edema and discharge. The mean Lund–Kennedy score improved from 7.2 ± 1.9 preoperatively to 2.1 ± 1.3 at 12 months ($p < 0.001$). Persistent mild edema was more frequently observed in patients with nasal polyps, although this did not correlate with poorer symptom scores.

Complications and Revision Surgery

Minor complications occurred in 8 patients (7.1%), including postoperative synechiae and mild epistaxis, all managed conservatively. No major complications such as orbital injury or cerebrospinal fluid leak were recorded. Revision surgery was required in 6 patients (5.4%), predominantly among those with extensive polyposis and comorbid asthma.

Predictors of Outcome

Multivariate analysis identified lower preoperative SNOT-22 scores, absence of asthma, and adherence to postoperative topical corticosteroid therapy as independent predictors of better surgical outcomes. Smoking status and age did not demonstrate a statistically significant association with postoperative improvement.

Discussion

The findings of this prospective study confirm that FESS is an effective and safe intervention for patients with medically refractory CRS, yielding significant and sustained improvements in both subjective symptoms and objective endoscopic findings. The magnitude of SNOT-22 score reduction observed aligns with, and in some cases exceeds, outcomes reported in recent multicenter studies, reinforcing the role of FESS as a quality-of-life–enhancing procedure.

The greater symptomatic improvement observed in patients with CRSwNP may reflect the relief of mechanical obstruction and inflammatory burden achieved through polyp removal. Nevertheless, the higher recurrence and revision rates in this subgroup underscore the chronic inflammatory nature of polyposis and the importance of long-term medical management, including topical corticosteroids and, in selected cases, biologic therapies.

The low complication rate in this series highlights the safety of contemporary endoscopic techniques when performed by experienced surgeons. The absence of major complications is consistent with current literature emphasizing the favorable risk–benefit profile of FESS. Importantly, adherence to postoperative care emerged as a modifiable predictor of success, emphasizing the need for patient education and structured follow-up.

Limitations of this study include its single-center design and the absence of a non-surgical control group. Additionally, longer follow-up would be valuable to assess durability of outcomes beyond one year. Future research should integrate objective biomarkers of inflammation and evaluate the interaction between surgical intervention and emerging medical therapies.

Conclusion

Functional endoscopic sinus surgery provides substantial and clinically meaningful improvement in symptoms and endoscopic findings in patients with chronic rhinosinusitis refractory to

medical therapy. The procedure demonstrates a high safety profile and low revision rate when combined with appropriate postoperative care. Patient selection, comorbidity management, and adherence to long-term topical therapy are critical determinants of optimal outcomes. These findings support the continued use and refinement of FESS as a central component of modern otorhinolaryngology practice.

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